

Additive Construction for Mobile Emplacement (ACME)

Completed Technology Project (2015 - 2018)



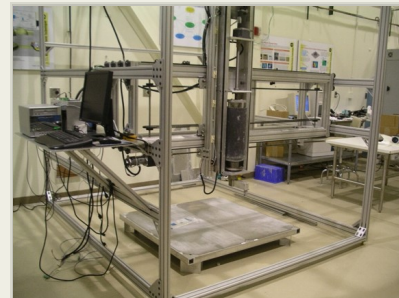
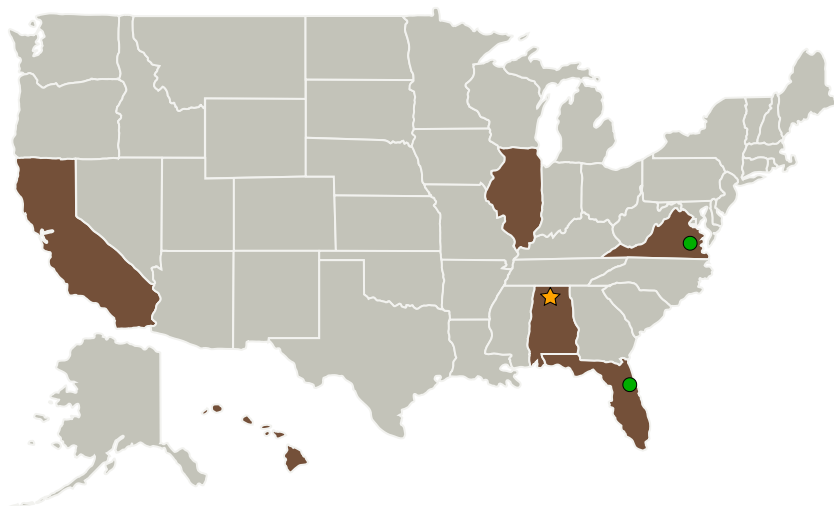
Project Introduction

Additive Construction with Mobile Emplacement (ACME) is like 2D and 3D printing on a large (structure) scale using in-situ resources for construction materials. ACME is a joint effort between NASA/GCD and the U.S. Army Corps of Engineers (USACE). Applications on terrestrial and planetary surfaces.

Anticipated Benefits

NASA unfunded: This project will benefit NASA as it develops concepts for habitat development on other planets, where launch up mass is at a premium and in-situ materials lend themselves well as construction materials. **OGA:** This project benefits the US Army Corps of Engineers (USACE) in their attempts to develop automated construction systems to replace plywood-based B-huts currently in use. These resulting structures would take less time to build, require less mass brought in-theater, require fewer personnel, have less waste, and could be left for local populations to inhabit when finished. **Nation:** This item benefits the Nation because it will be utilized by the US Army Corps of Engineers (USACE), has applicability to USAID and FEMA, and is in work to be applied in commercial construction by Caterpillar. Also benefits the small business Contour Crafting Corporation.

Primary U.S. Work Locations and Key Partners



MSFC Additive Construction
Research & Development
Laboratory

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
● Kennedy Space Center (KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida
● Langley Research Center (LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Alabama	California
Florida	Hawaii
Illinois	Virginia

Project Transitions

**January 2015:** Project Start**November 2018:** Closed out

Closeout Summary: The Additive Construction with Mobile Emplacement (ACME) project was a joint venture between NASA and the United States Army Corps of Engineers Engineer Research and Development Center – Construction Engineering Research Laboratory (ERDC-CERL). The development effort focused using excavated in-situ materials for the construction of large-scale structures, like habitats, using autonomous, additive layering techniques. The product of this effort will provide the ability to protect people, hardware, and electronics while on the surface of an extraterrestrial body. The ACME project established a large-scale additive construction system with a continuous material feed subsystem using a printing gantry and material delivery pump. The goal of the project was highly synergistic with NASA's efforts aimed at autonomous construction of planetary surface structures and the Army's interest to manufacture buildings using local materials.

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Game Changing Development

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

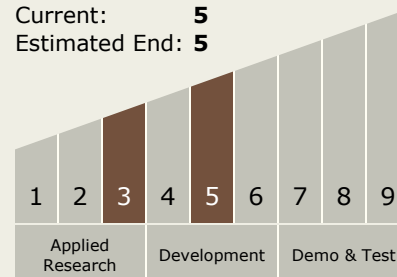
Gary F Meyering

Principal Investigator:

John C Fikes

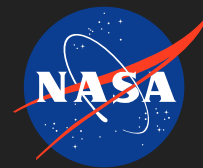
Technology Maturity (TRL)

Start: **3**
 Current: **5**
 Estimated End: **5**

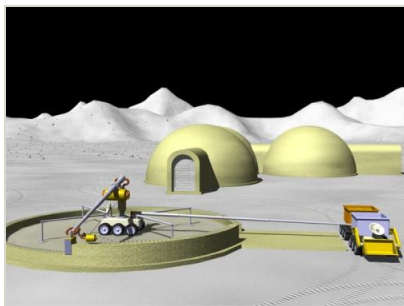


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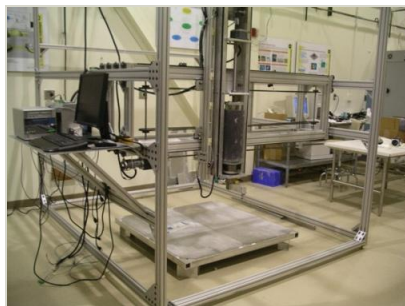


Images



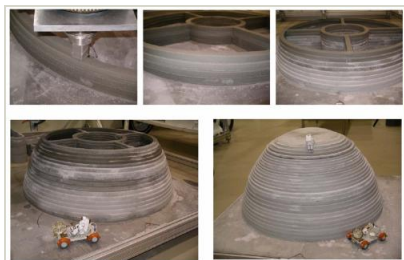
ACME - 1

Conceptual Design of a Lunar Additive Construction Habitat
(<https://techport.nasa.gov/image/143214>)



ACME - 2

MSFC Additive Construction Research & Development Laboratory
(<https://techport.nasa.gov/image/143245>)



ACME - 3

Additive Construction of Concrete Dome in MSFC Additive Construction Research Laboratory
(<https://techport.nasa.gov/image/143217>)

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Target Destinations

The Moon, Mars, Others Inside the Solar System